Results of the variability studies in and between the cotton bales produced in Africa

Résultats des études de variabilité au sein et entre les balles de coton produites en Afrique

GOURLOT J.-P., ABOÉ M.,
LUKONGE E. and GOZÉ E.

Arusha, January 2012

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the European Union and the
Common Fund for Commodities

Plan of presentation
Plan de présentation

- Within-bale variability
- Between bales variability
- Next steps
- Conclusion

- Variabilité intra-balle
- Variabilité inter-balles
- Prochaines étapes
- Conclusion

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- First: how did we come to these studies?

- Variabilité intra-balle
- Variabilité inter-balles
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- En premier : pour quelle(s) raison(s) ces études

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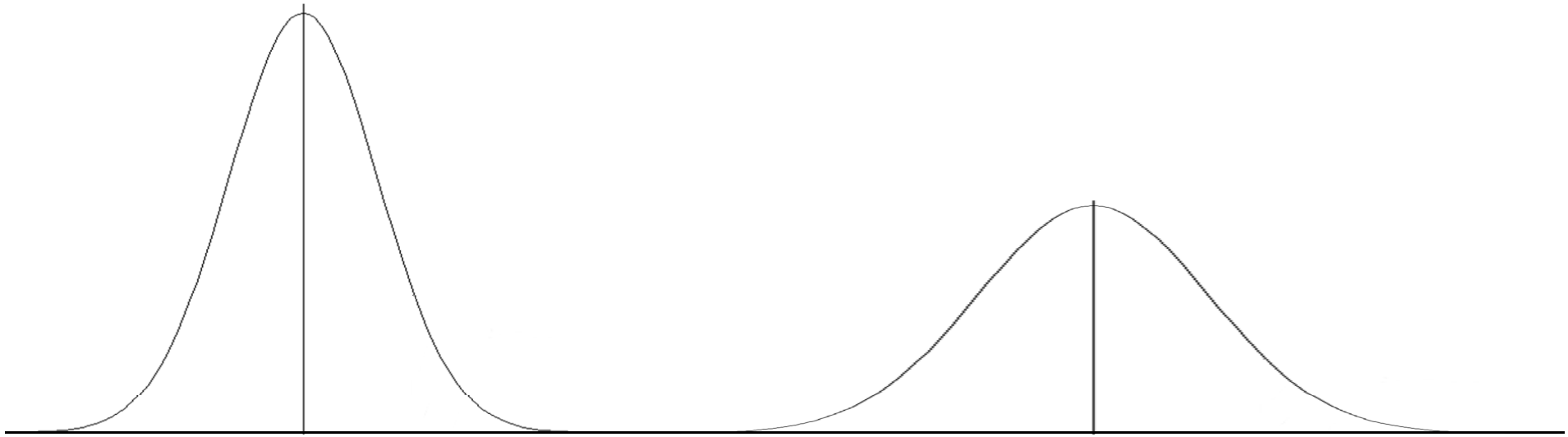
Results are more or less variable
Les résultats sont + ou - variables

Lower variability

Higher variability



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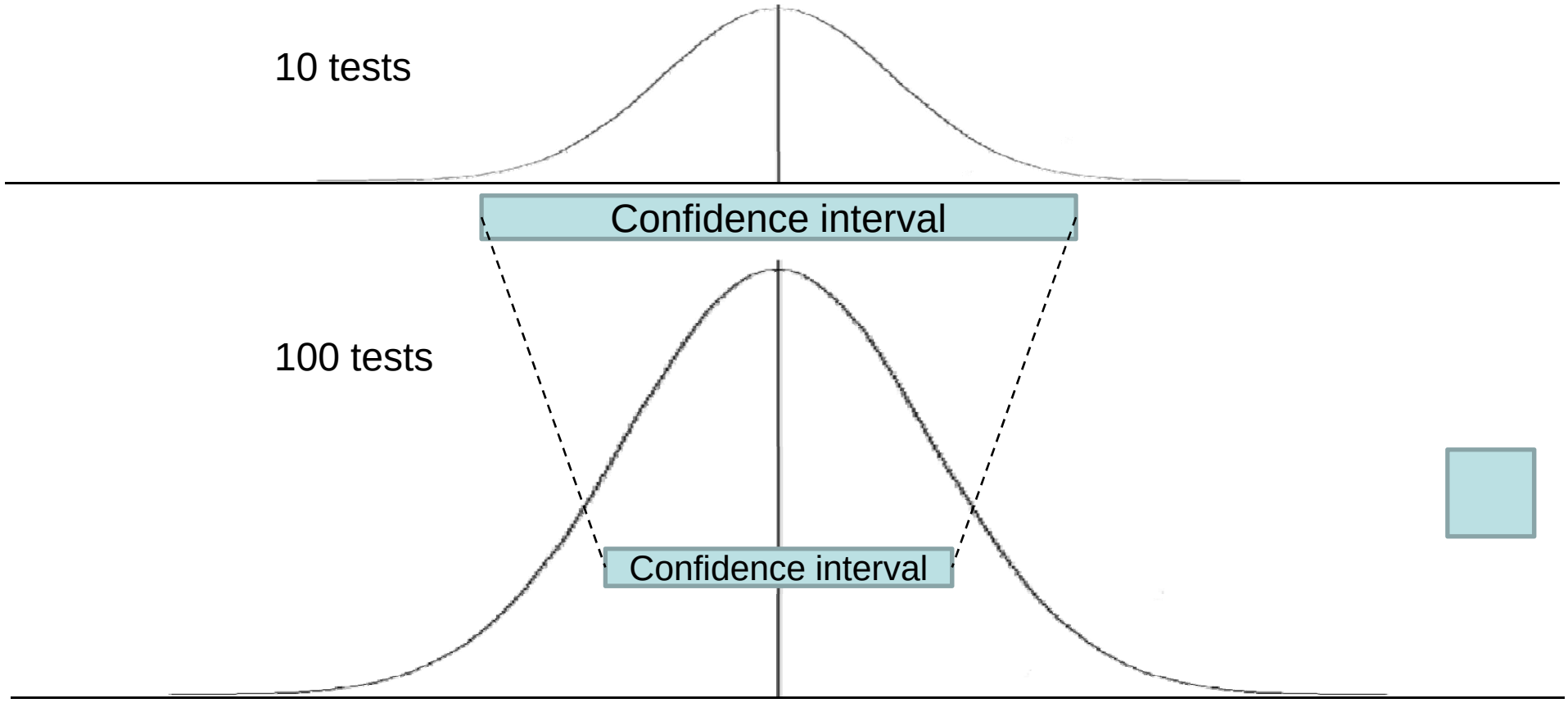
Increase tests => better precision
Plus de tests=>meilleure précision

$$\text{Confidence interval} = \frac{t \cdot \text{Sigma}}{\sqrt{n}}$$

When / quand n ↗
=> confidence interval ↘



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Agreed international tolerances
Tolérances internationales

Characteristic	Commercial tolerances
UHML	+/- 0.508 mm
UI	+/- 1 %
Strength	+/- 1.5 g/tex
Micronaire	+/- 0.1 unit
Rd	+/- 1 %
X.b (Yellowness)	+/- 0.5 unit

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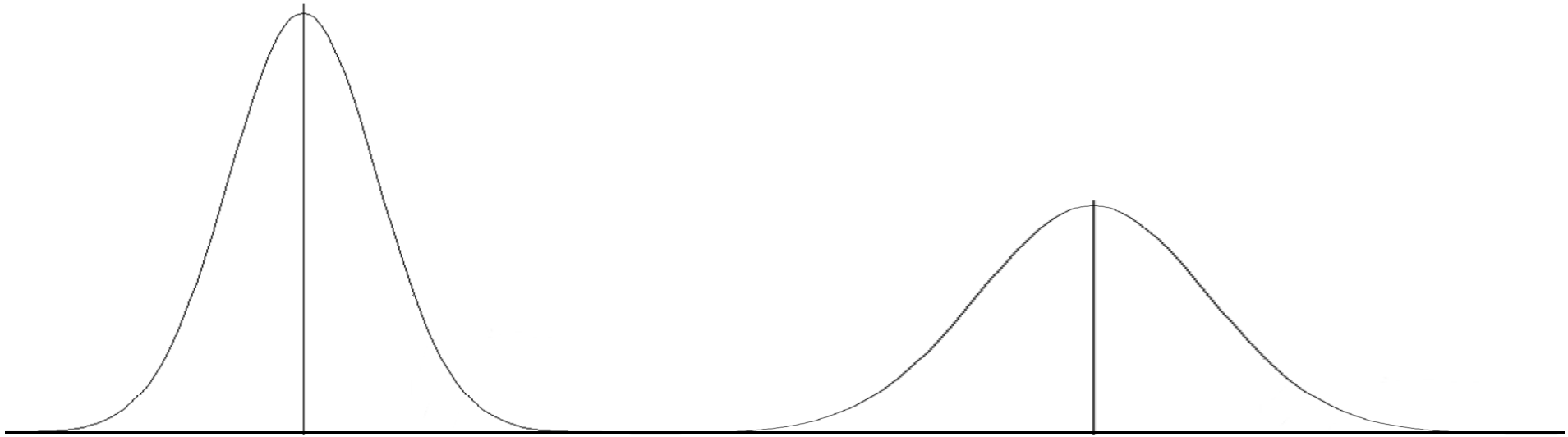
Results are more or less variable
Les résultats sont + ou - variables

Lower variability

Higher variability



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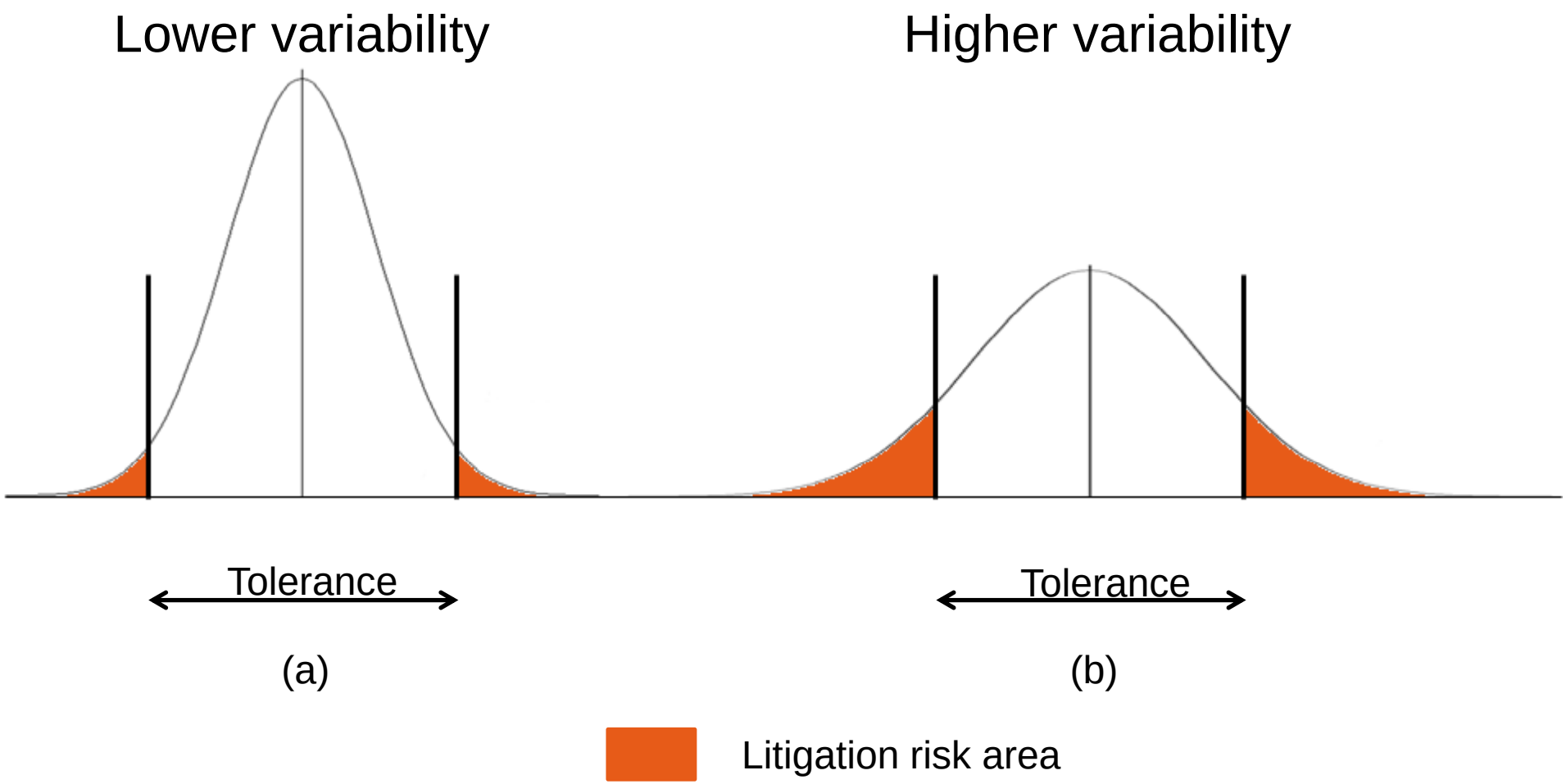
Variability, tolerances, litigation risk
Variabilité, tolérances, risque de litige



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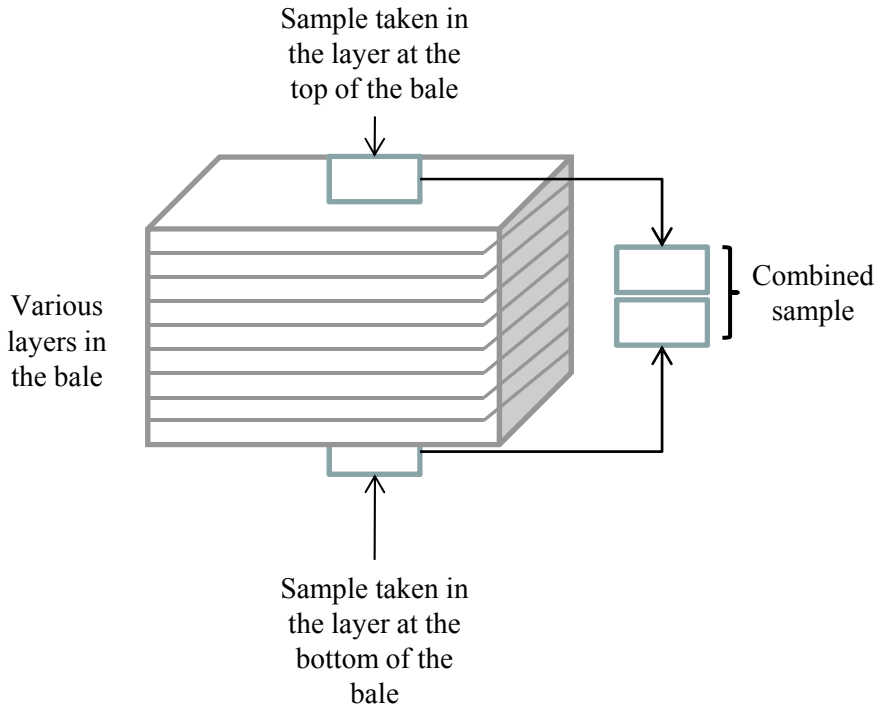
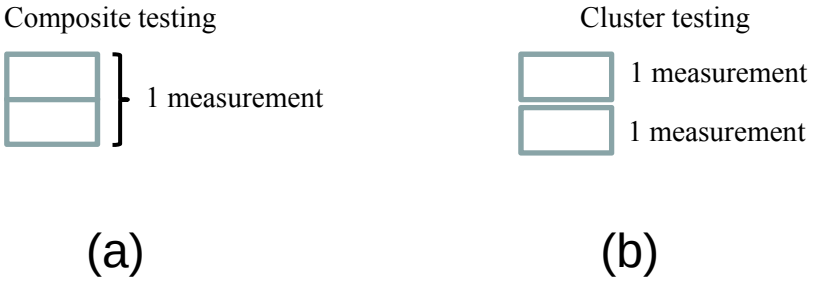
Sampling and testing modalities
Modalités de test et d'échantillonnage

Sampling in the bale

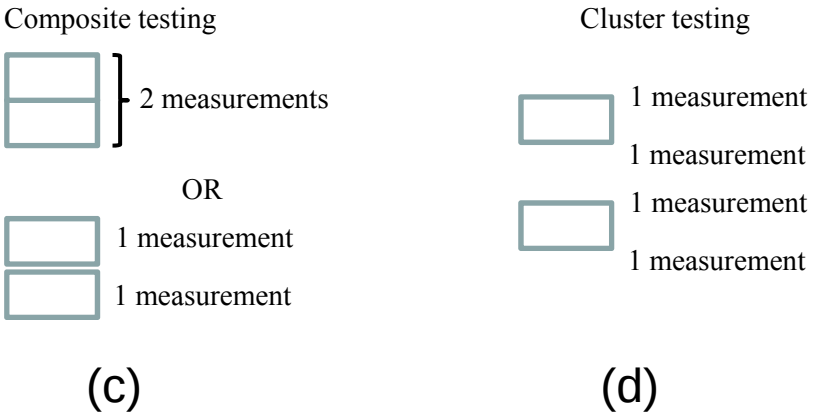


Sample testing

Sample analysis with one replicate of one measurement per sample



Sample analysis with one replicate of two measurements per sample



De Aboé, M. *et al* (2011). Textile Research Journal (Sous presse)

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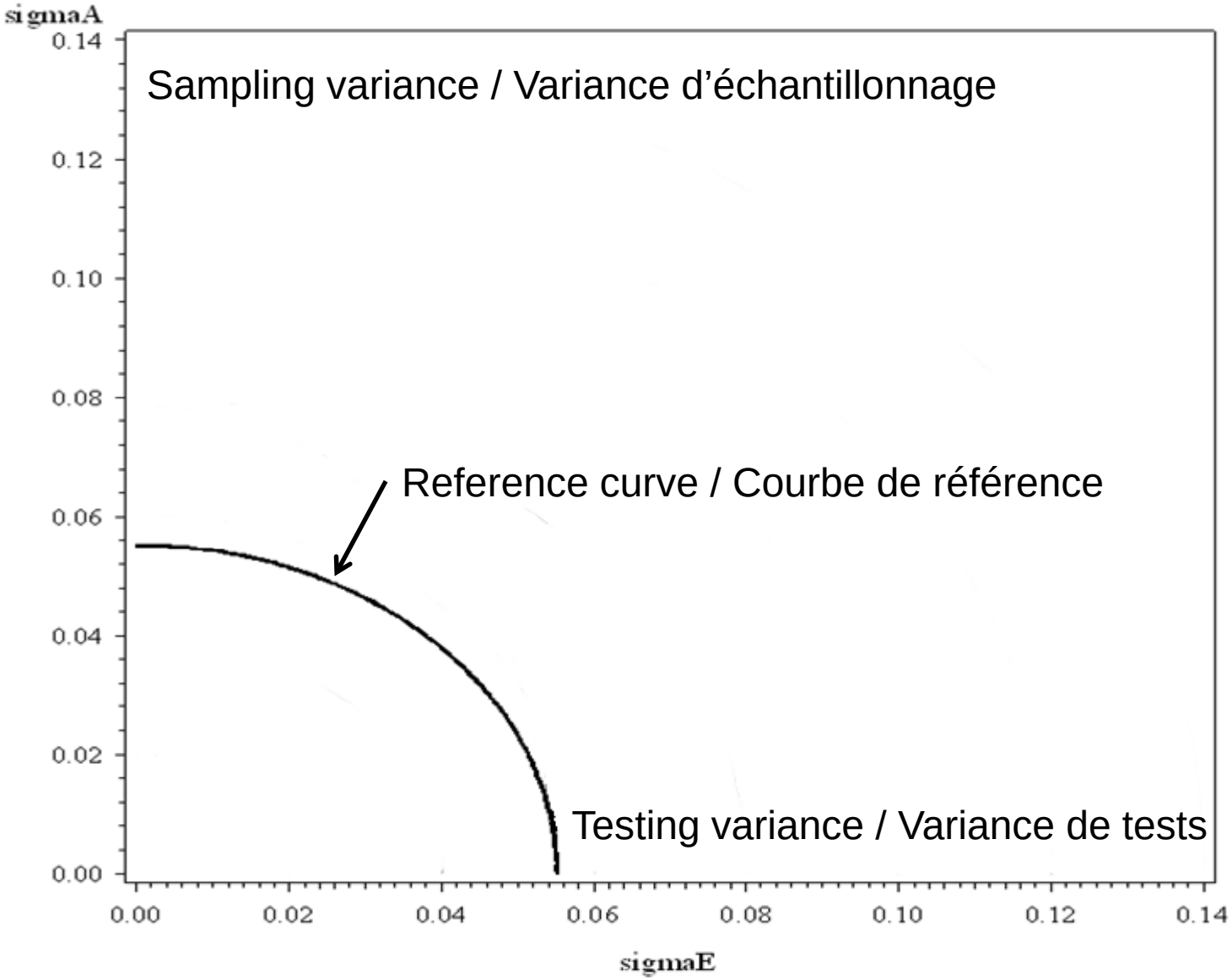
Iso-variances charts
Graphes d'iso-variance



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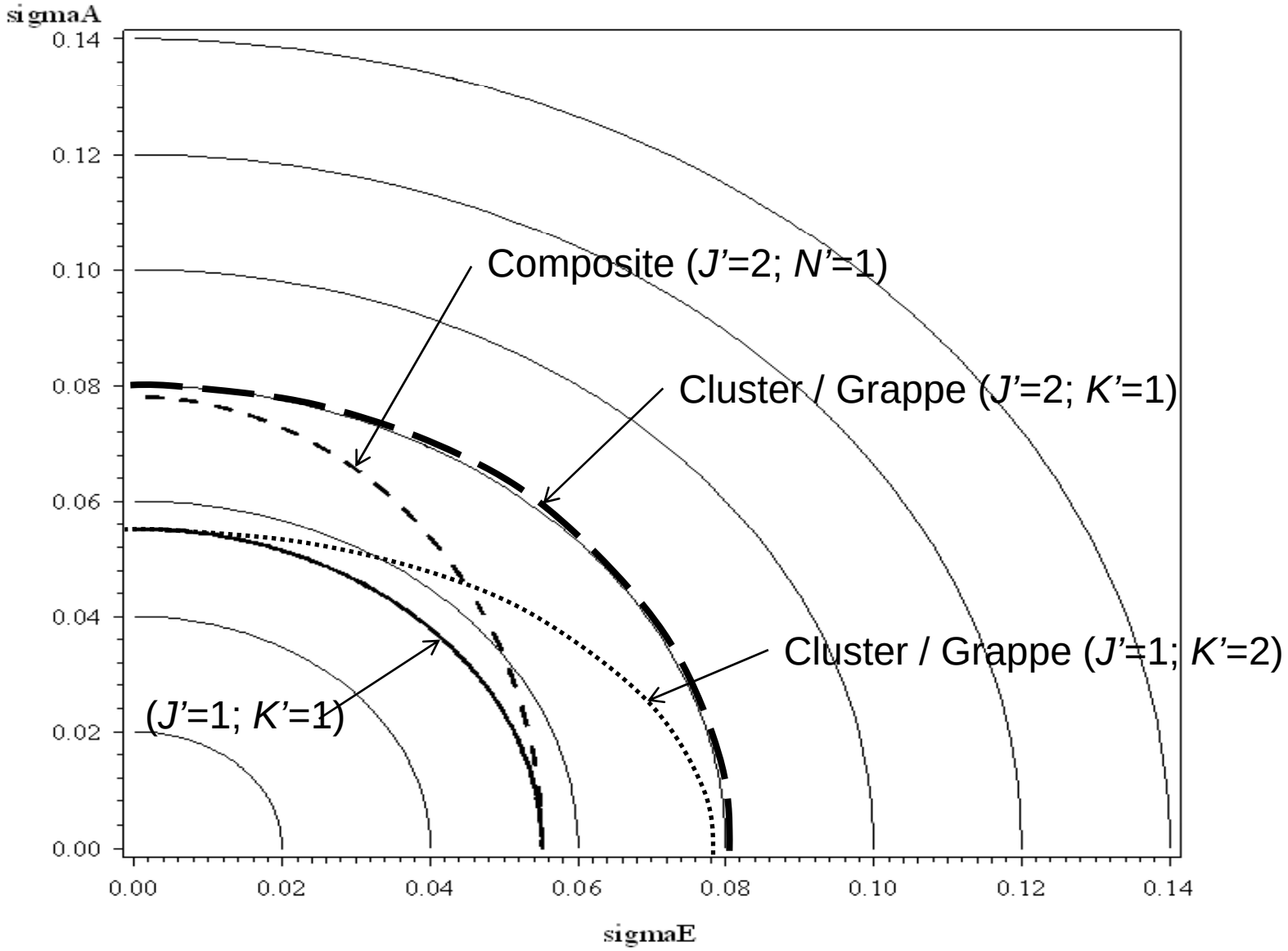
Iso-variances charts
Graphes d'iso-variance



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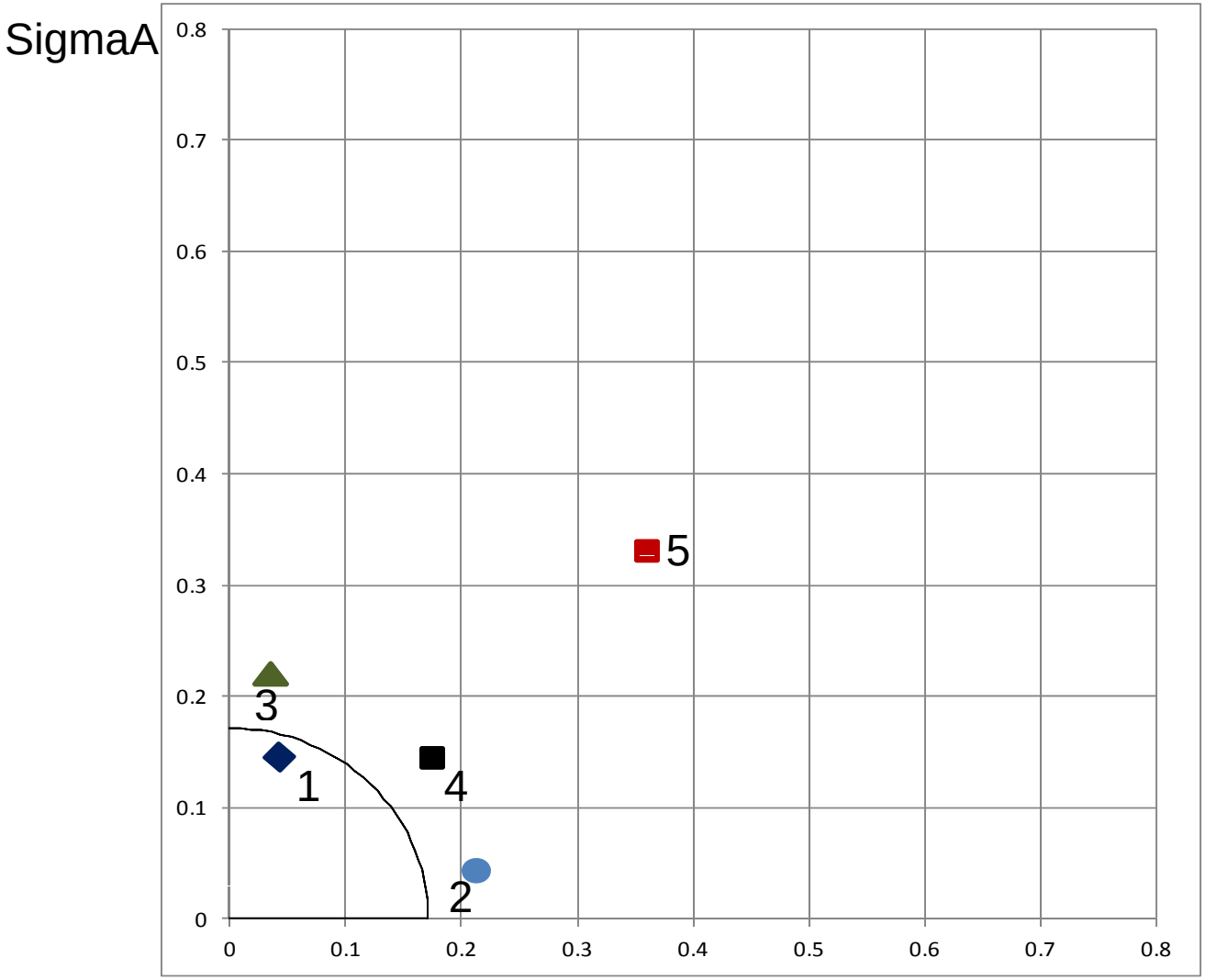
Examples of relationships
Exemples de relations



J'=1
K'=1

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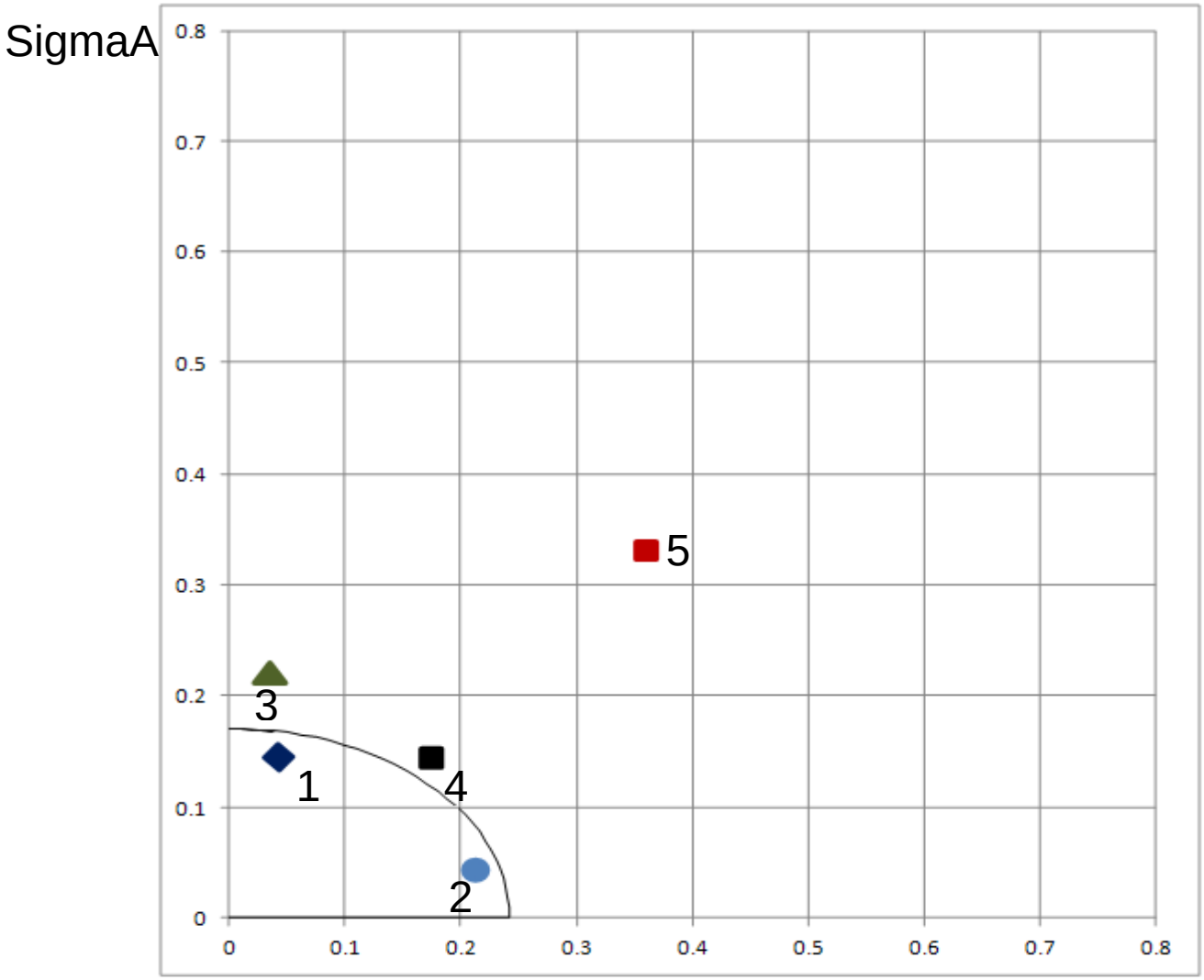
Examples of relationships
Exemples de relations



J'=1
K'=2

Cluster

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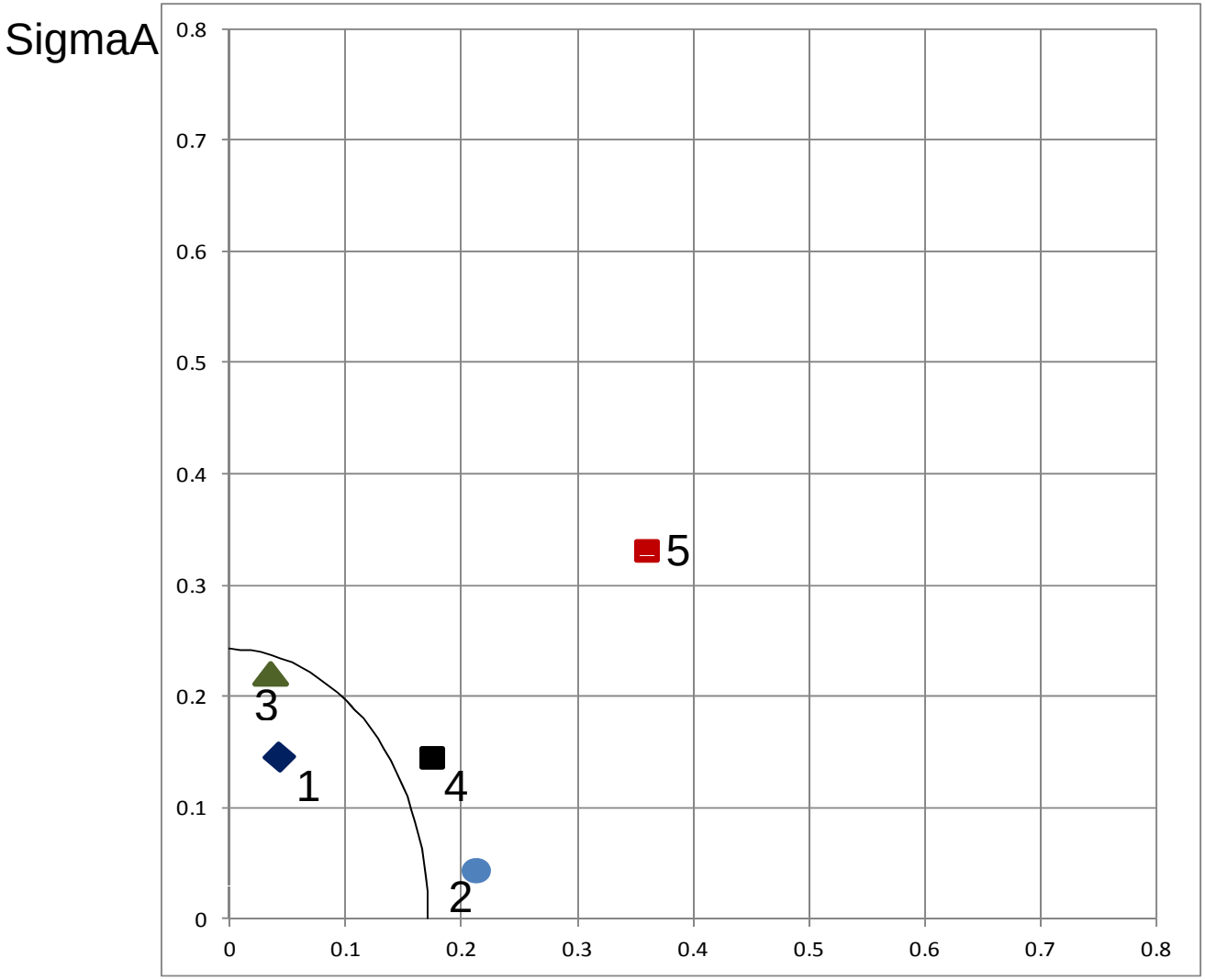
Examples of relationships
Exemples de relations



J'=2

N'=1
Composite

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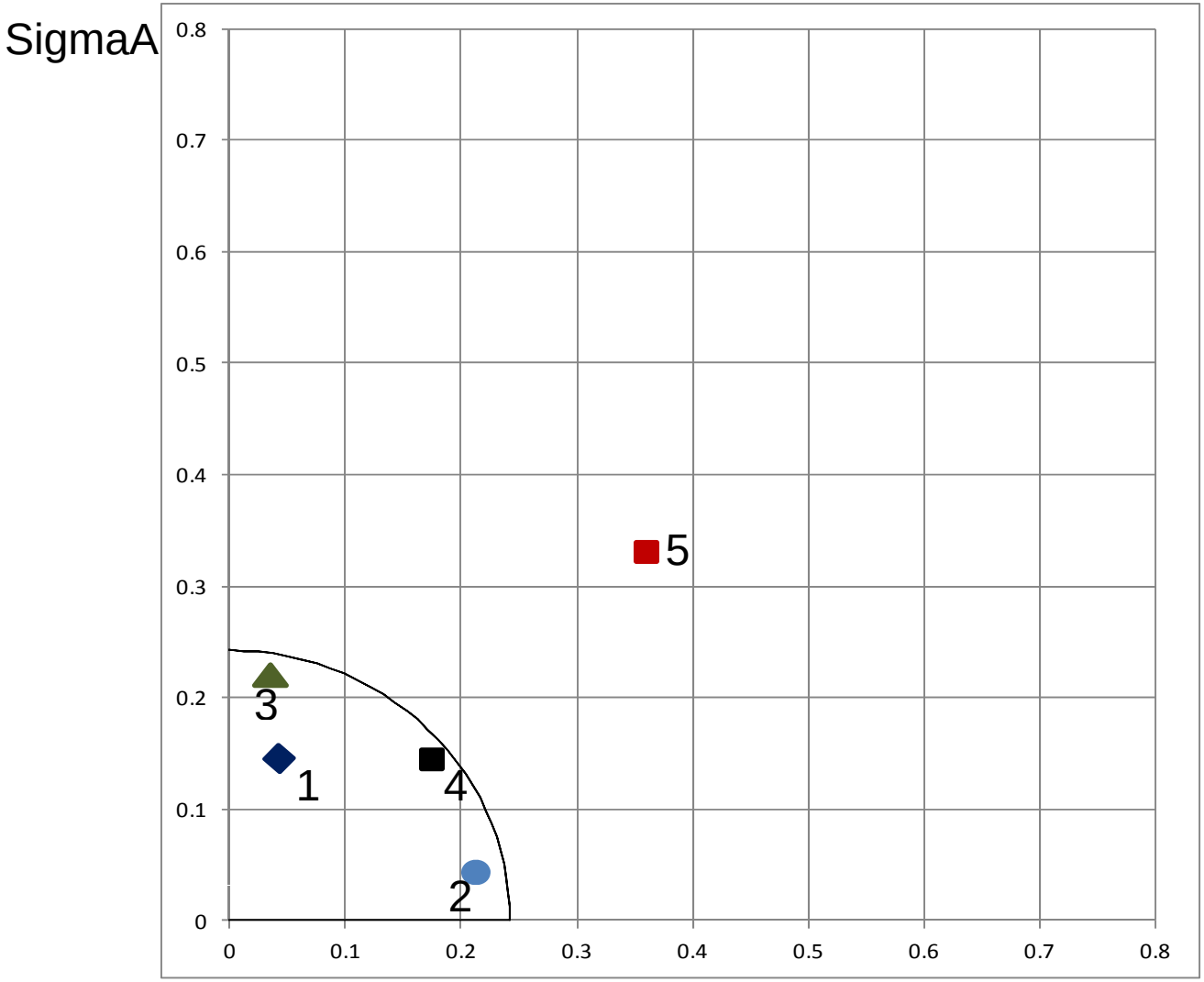
Examples of relationships
Exemples de relations



J'=2
K'=1

Cluster

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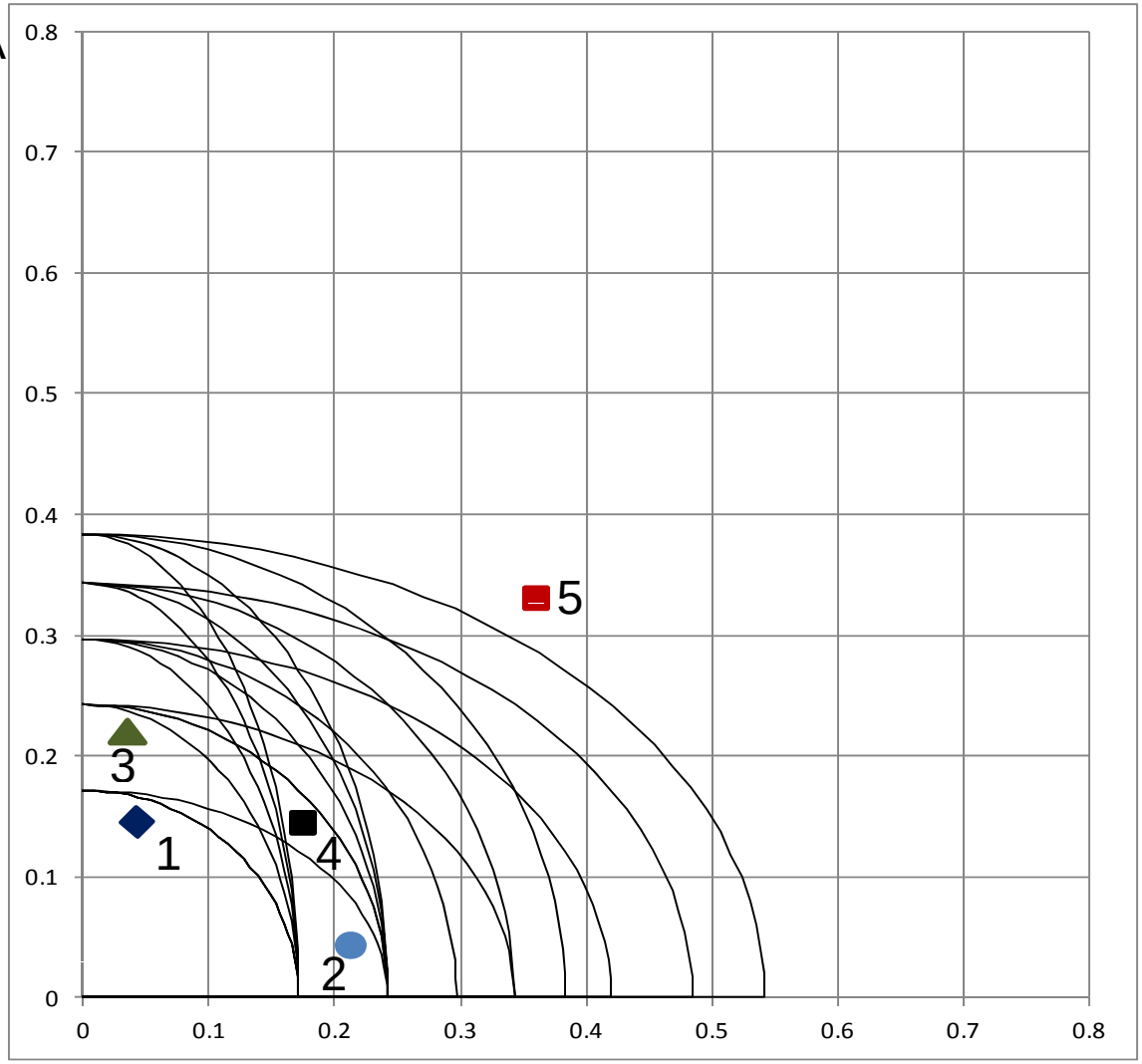
Examples of relationships
Exemples de relations

SigmaA



SigmaE

J'=1,2,3,4,5
K'= 1,2
N'=1,2,3,4

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Conclusion from the 1st study*
Conclusion de la 1° étude*

Taking care of

- Situations
- Variability levels within bales (between layers and between repetitions of measurements)
- Agreed international tolerances
- Litigation risk set at 10% for individual bales

En prenant en compte

- Situations
- Niveaux de variabilité au sein des balles (entre couches et entre répétitions de mesures)
- Tolérances internationales reconnues
- Risque de litige fixé à 10% sur les balles individuelles

*: From Aboé et al, 2011 (sous presse)

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Conclusion from the 1st study*
Conclusion de la 1° étude*

Characteristic	Nb of samples per bale	Type of sampling	Nb of replicates	Nb of measurements per sample	Total Nb of measurements per bale
			USA		
Micronaire	2	Composite	1	1	1
UHML	2	Cluster	1	1	2
UI	2	Cluster	1	1	2
STR	2	Cluster	1	1	2
Rd	2	Cluster	1	2	4
+b	2	Cluster	1	2	4
Proposition for Africa / Proposition pour l'Afrique					
Micronaire	2	Composite	1	1	1
UHML	2	Cluster	1	2	4
UI	2	Cluster	1	2	4
STR	2	Cluster	1	2	4
Rd	2	Composite	1	2	2
+b	2	Composite	1	2	2
For saw ginned cottons / pour les cotons égrenés à la scie					

*: From Aboé et al, 2011 (sous presse)

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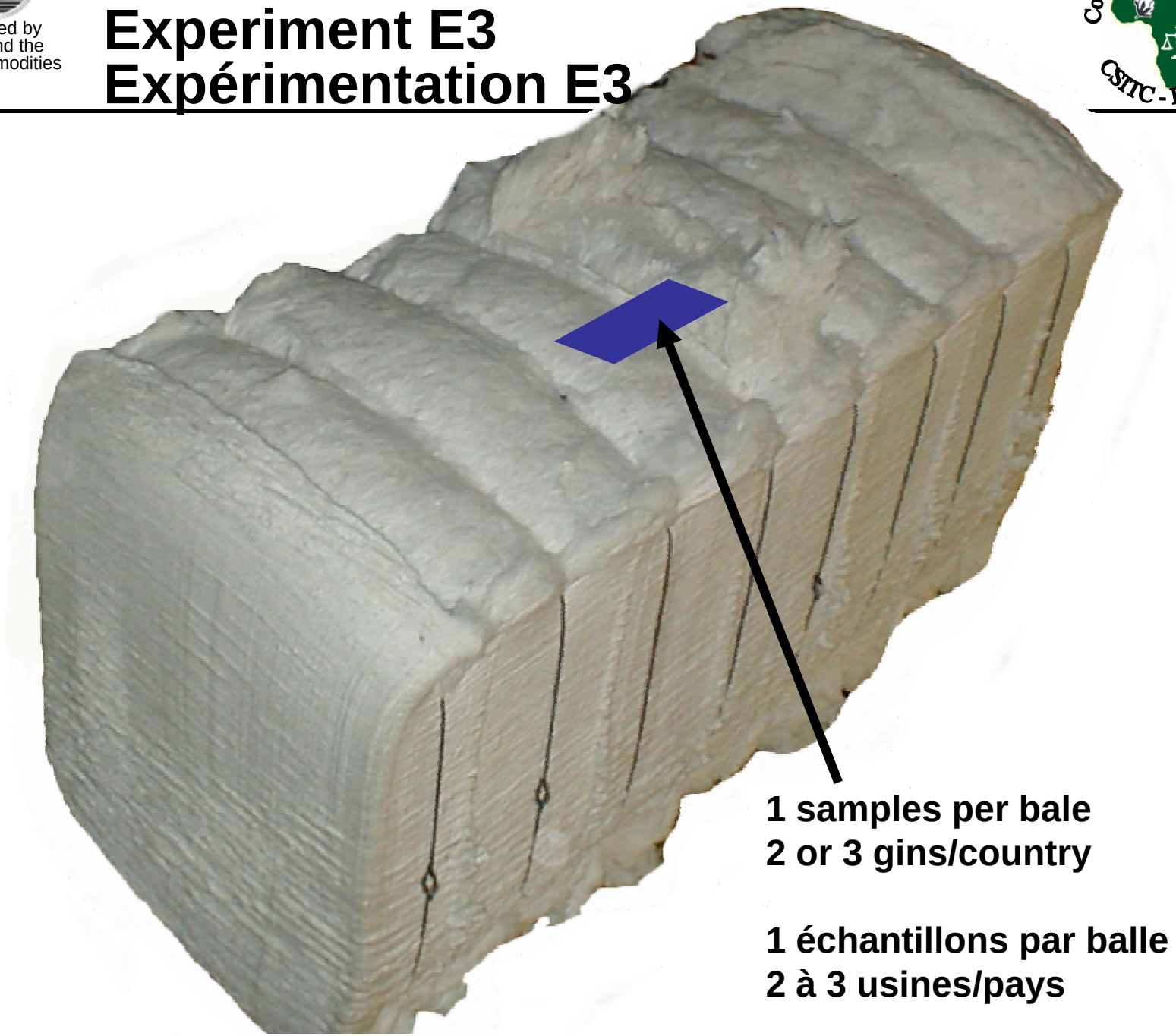
Experiment E3
Expérimentation E3



1 samples per bale
2 or 3 gins/country

1 échantillons par balle
2 à 3 usines/pays

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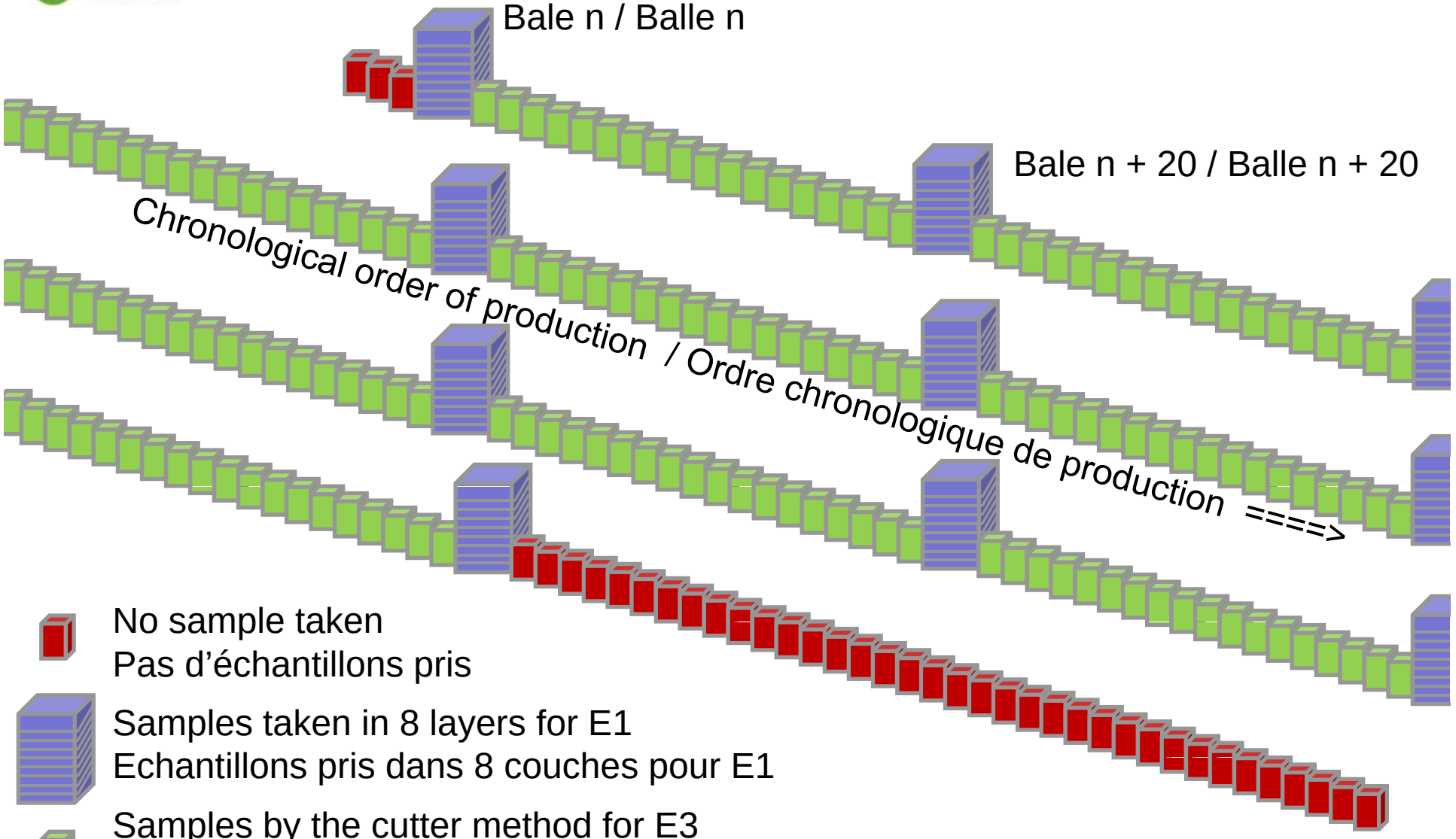
Sampling for E1 and E3
Echantillonnage pour E1 et E3



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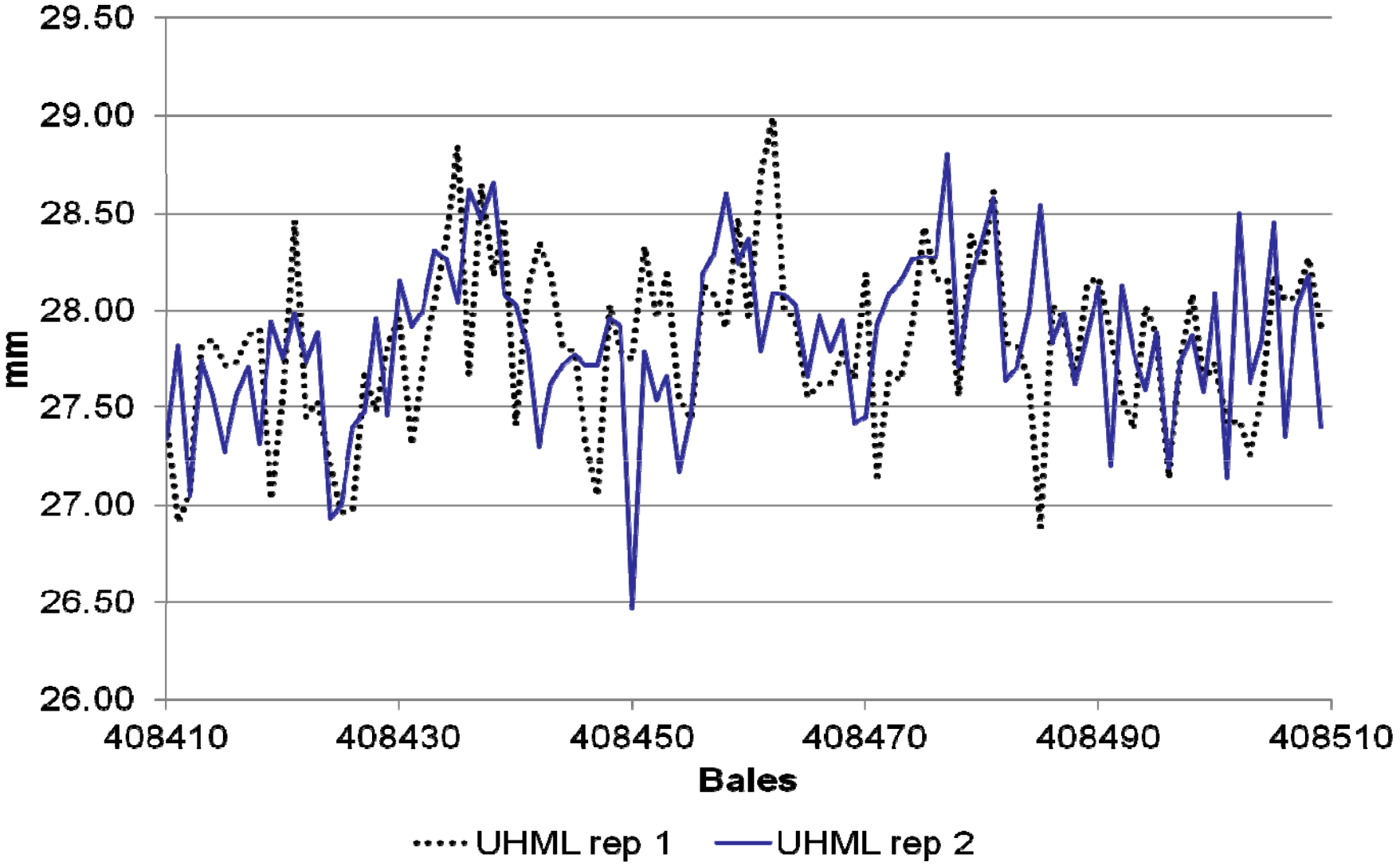
Between bales variability
Variabilité entre balles

Results are even accross the bales in this lot



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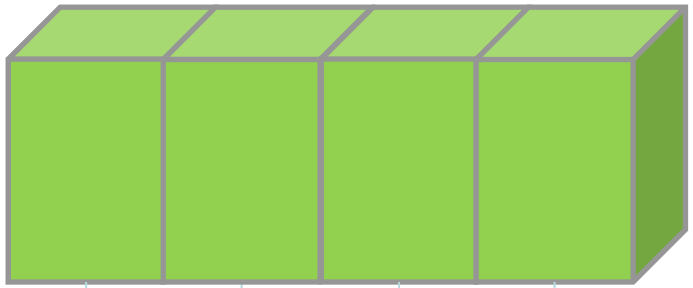
Between bales variability
Variabilité entre balles



Distance

One bale — Sd1, Sd2, Sd3 — Mean (Sd1, Sd2, …, Sd6)

Two bales — Sd a, Sd b — Mean (Sd a, Sd b)

Three bales — Sd X — Sd X

… bales

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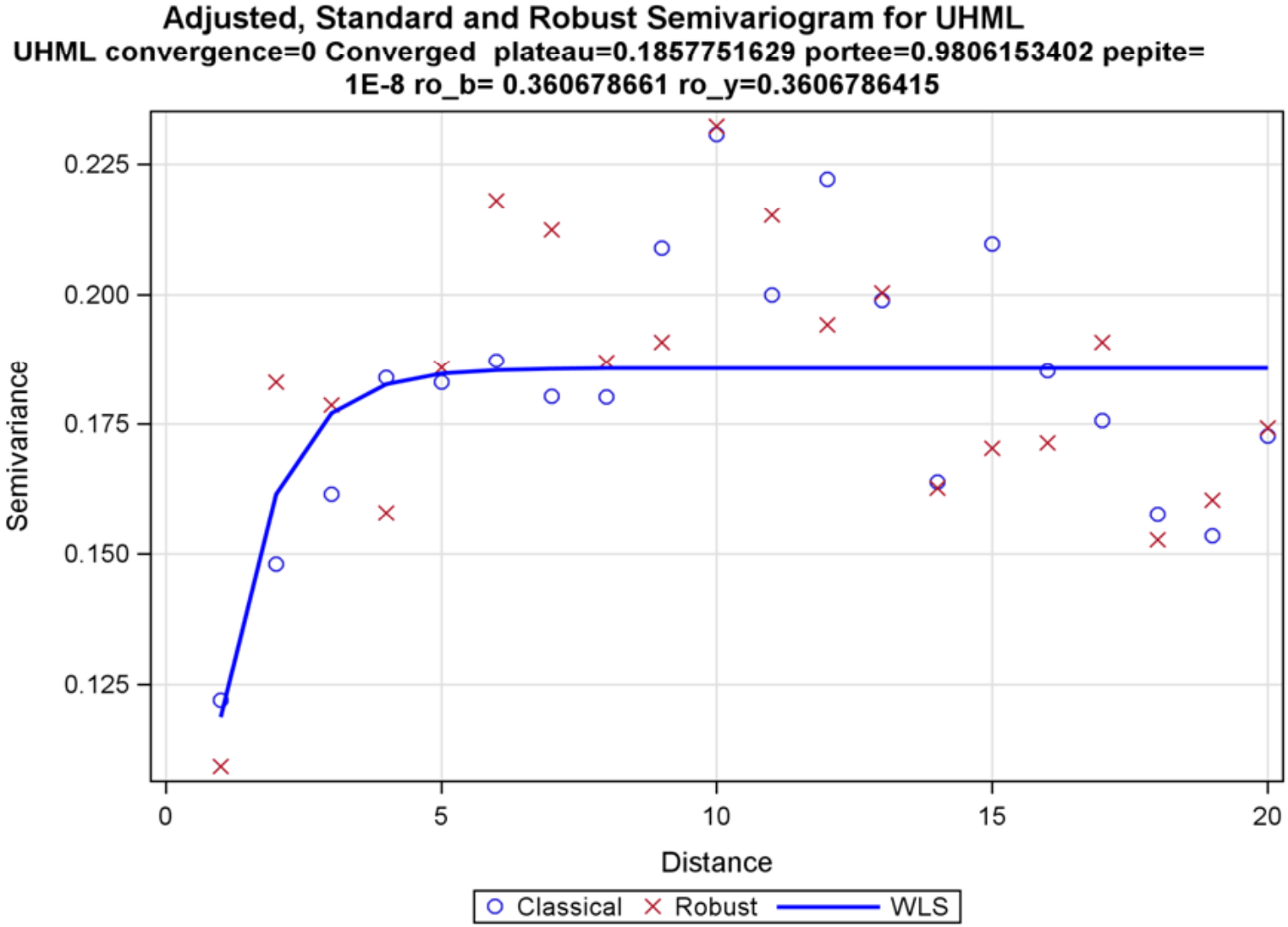
Between bales variability
Variabilité entre balles



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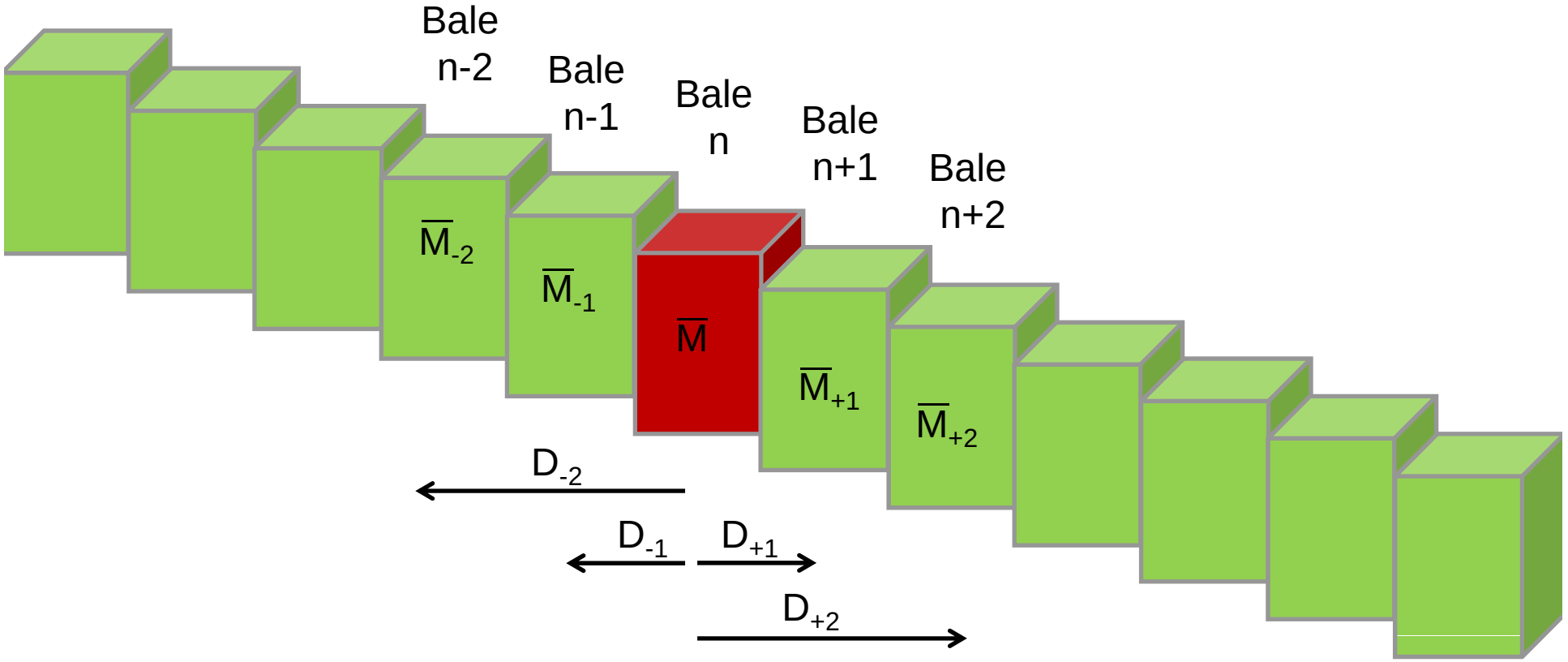
Weighted averaging process
Moyenne mobile pondérée



$$\text{Value of Bale n} = \frac{(D_{-2} \cdot \overline{M}_{-2}) + (D_{-1} \cdot \overline{M}_{-1}) + (\overline{M}) + (D_{+1} \cdot \overline{M}_{+1}) + (D_{+2} \cdot \overline{M}_{+2})}{D_{-2} + D_{-1} + 1 + D_{+1} + D_{+2}}$$

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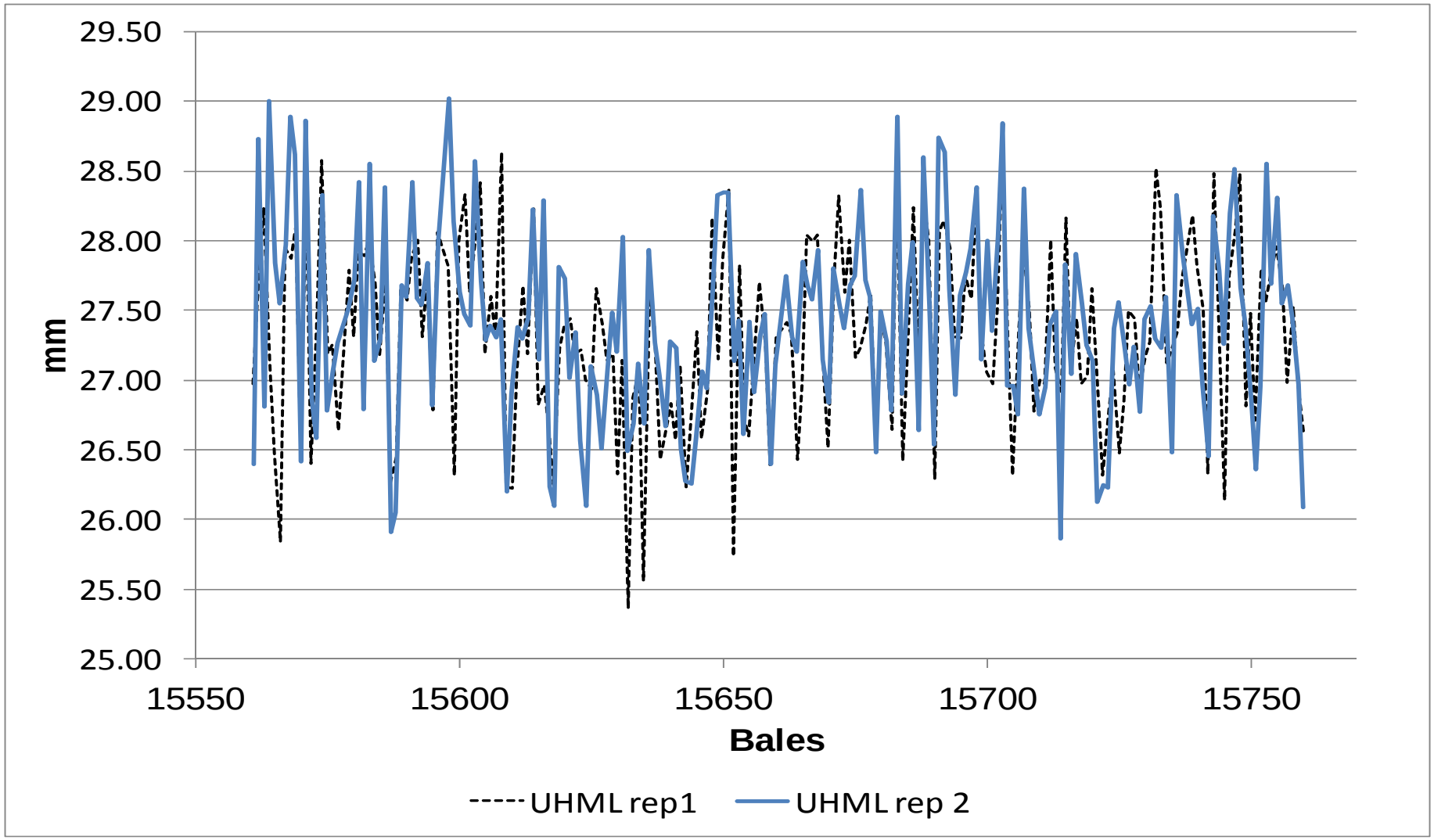
Between bales variability
Variabilité entre balles

Results are NOT even accross the bales in this lot



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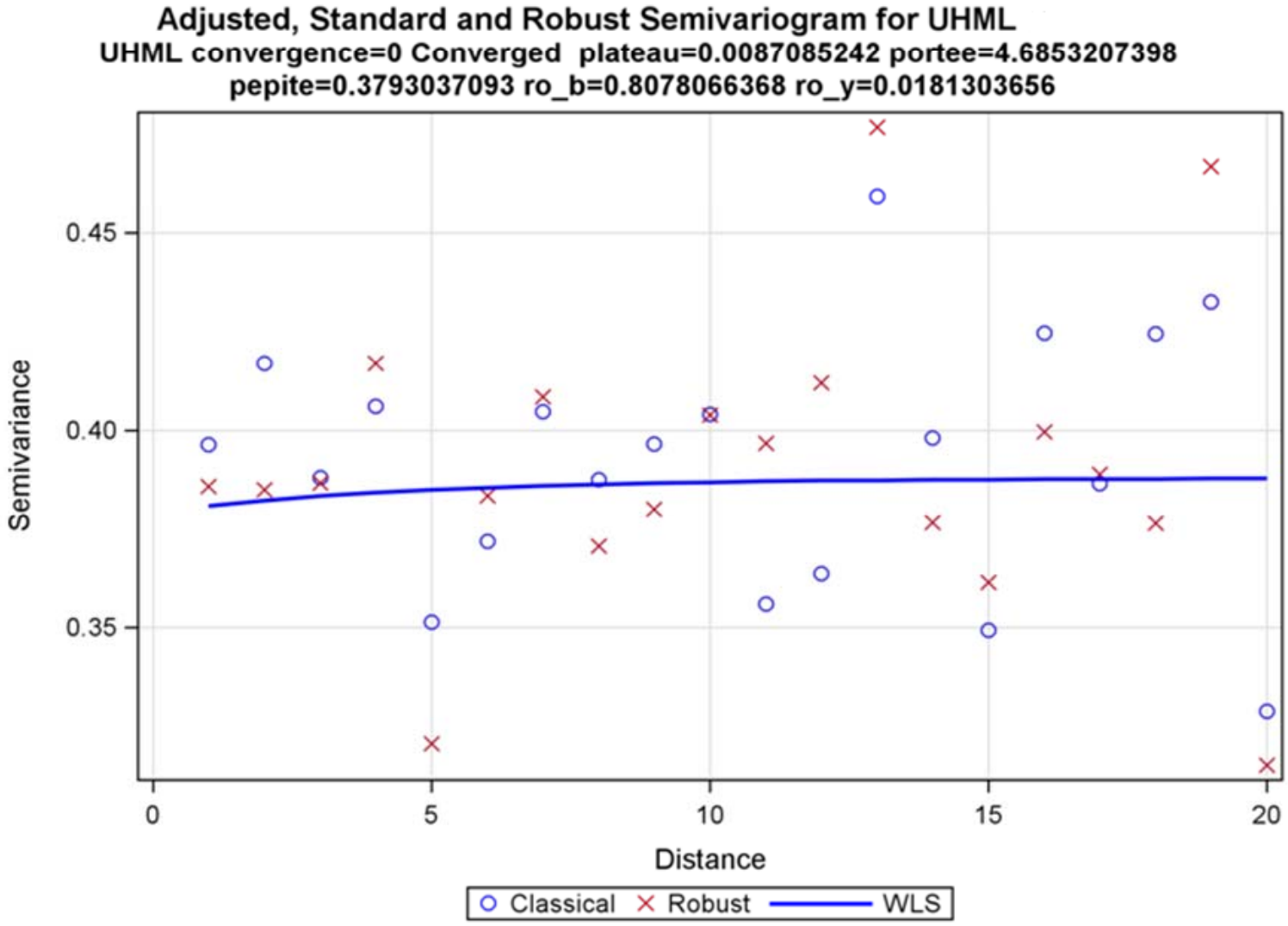
Between bales variability
Variabilité entre balles



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Conclusion from the 2nd study
Conclusion de la 2° étude

Taking care of

- Situations
- Variability levels between the bales at various distances
- Agreed international tolerances
- Litigation risk set at 10% for individual bales

En prenant en compte

- Situations
- Niveaux de variabilité entre les balles à différentes distances
- Tolérances internationales reconnues
- Risque de litige fixé à xx% sur les balles individuelles

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Conclusion from the 2nd study
Conclusion de la 2° étude

Taking care of

- Situations
- Variability levels between the bales at various distances
- Agreed international tolerances
- Litigation risk set at 10% for individual bales

=> Improved procedures

En prenant en compte

- Situations
- Niveaux de variabilité entre les balles à différentes distances
- Tolérances internationales reconnues
- Risque de litige fixé à xx% sur les balles individuelles

=> Procédures améliorées

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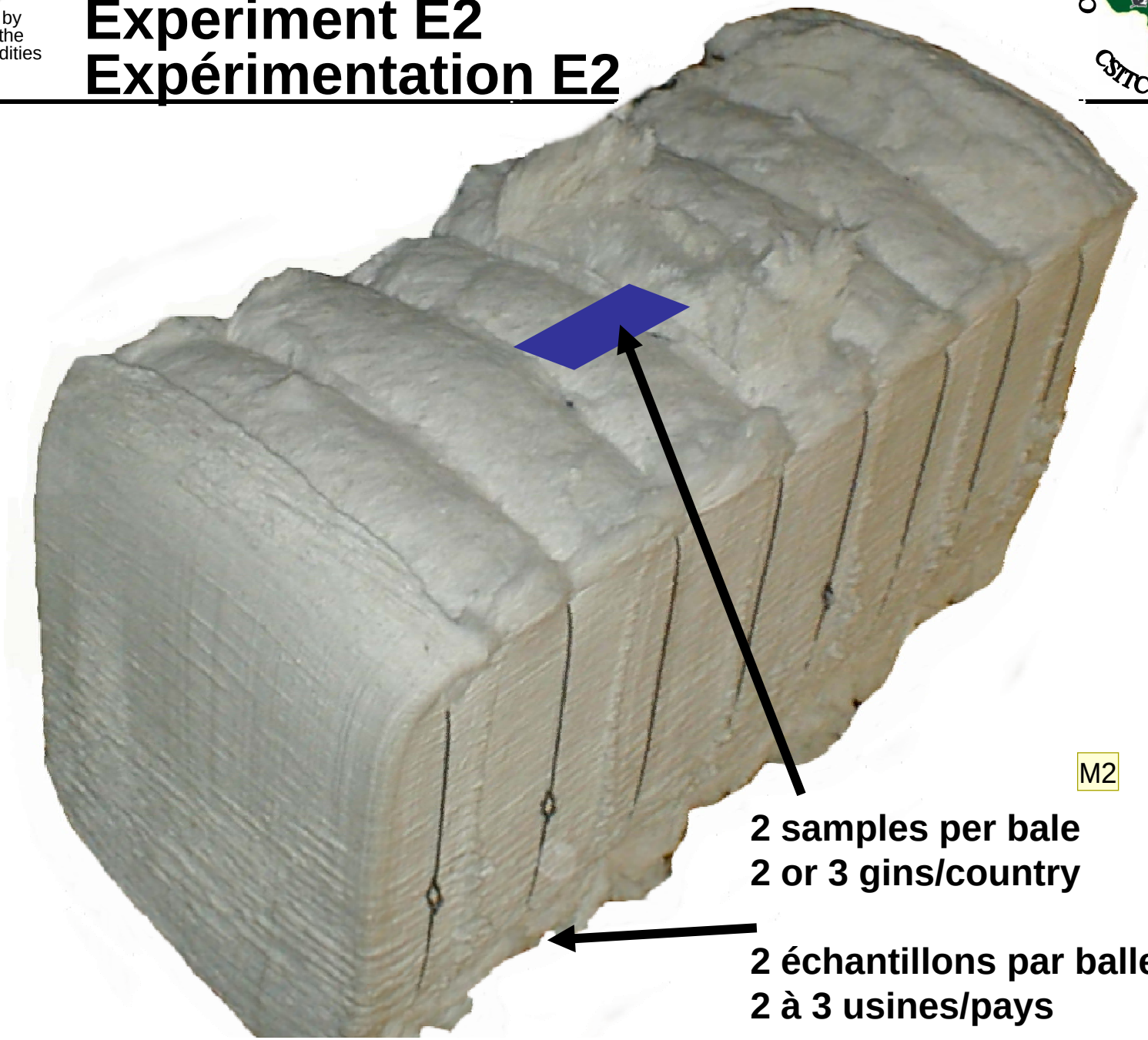
Experiment E2
Expérimentation E2



2 samples per bale
2 or 3 gins/country

2 échantillons par balle
2 à 3 usines/pays

Diapositive 30

M2 JPG pour bien décrire en anglais

Modeste, 01/03/2011

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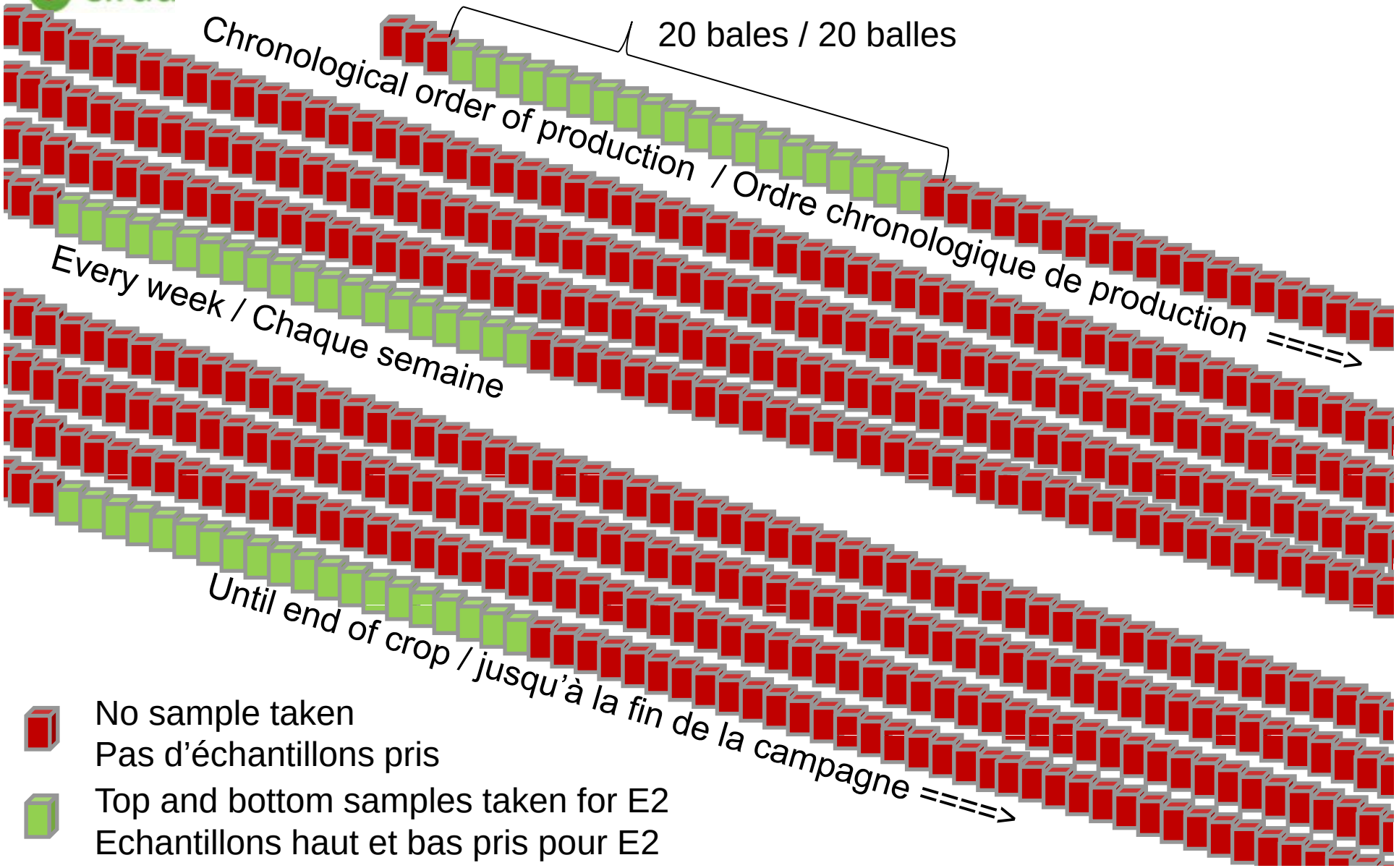
Sampling for E2
Echantillonnage pour E2



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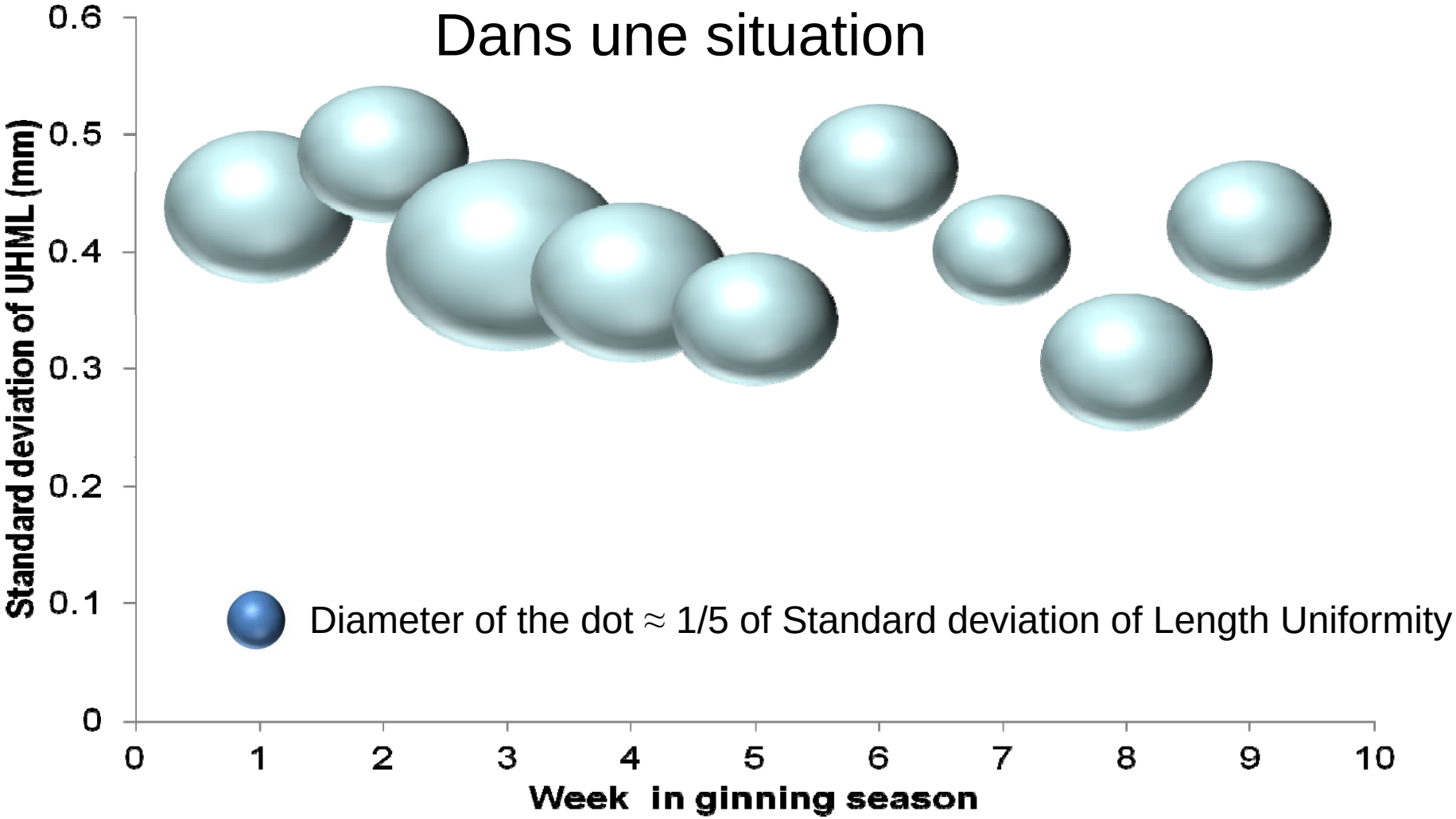
Within-bale variability, season
Variabilité intra-balles, campagne

In one situation

Dans une situation



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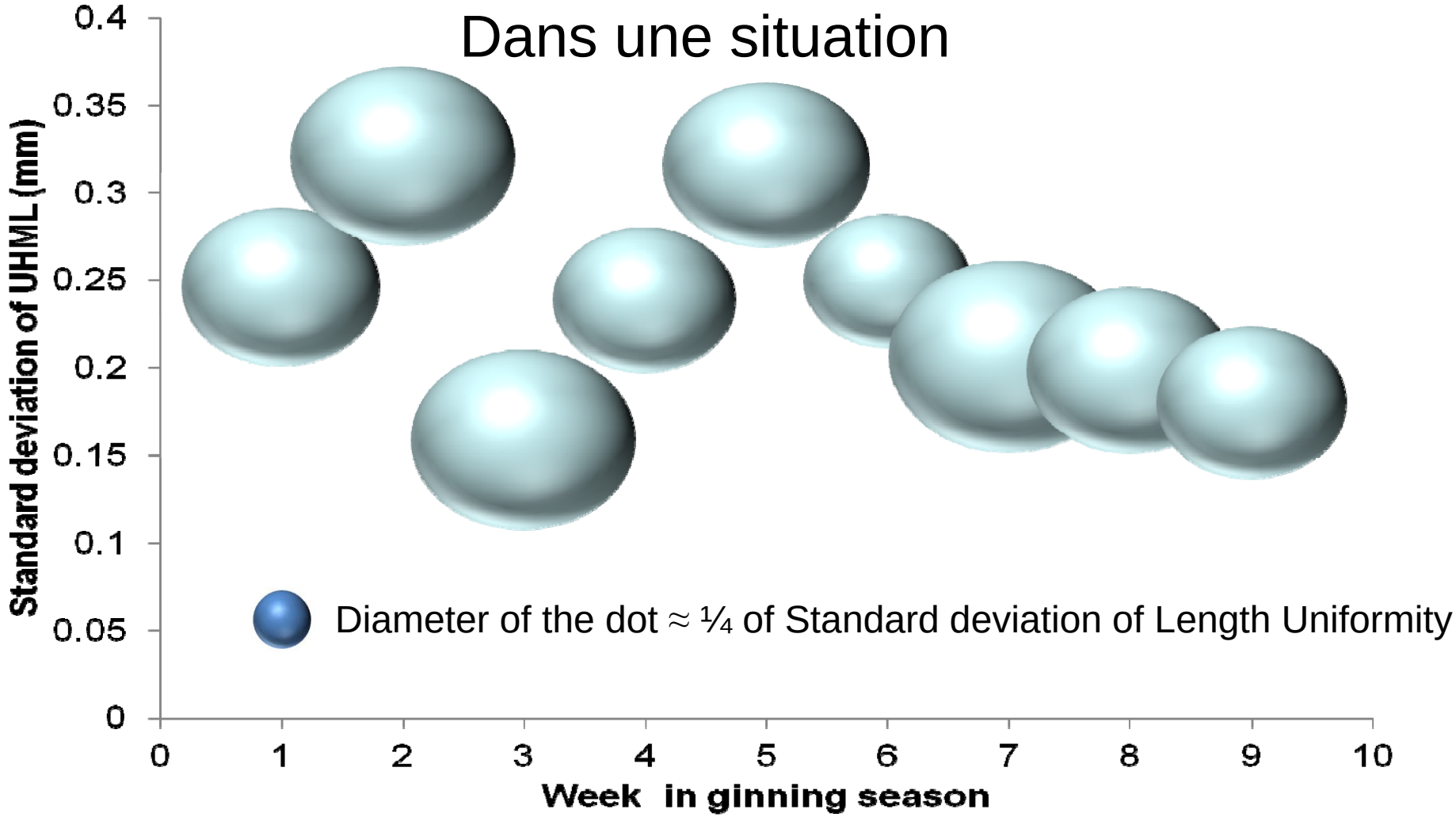
Between bales variability, season
Variabilité entre balles, campagne

In one situation

Dans une situation



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Next steps
Prochaines étapes

- Ginning practices to be improved and/or studied in some cases

- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas

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Next steps
Prochaines étapes

- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale

- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle

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Next steps
Prochaines étapes

- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- All sites will receive a personalized and confidential report

- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Toutes les usines recevront un rapport personnalisé et confidentiel

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Next steps
Prochaines étapes

- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- All sites will receive a personalized and confidential report
- Start grouping bales into lots of homogeneous levels … and

- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Toutes les usines recevront un rapport personnalisé et confidentiel
- Commencer à grouper les balles par lots de niveaux homogènes … et

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Next steps
Prochaines étapes

- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- All sites will receive a personalized and confidential report
- Start grouping bales into lots of homogeneous levels … and
- Start getting information on the financial benefit of using instrumental data for cotton classification and trading

- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Toutes les usines recevront un rapport personnalisé et confidentiel
- Commencer à grouper les balles par lots de niveaux homogènes … et
- Commencer à regrouper les information sur le bénéfice financier d'utiliser les mesures instrumentales pour le classement de coton et sa commercialisation

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Limitations of the studies
Limites d'études

- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- Test procedures for a serie of seasons as the variability may depend on several annual factors.

- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Tester les procédures sur quelques campagnes car la variabilité est dépendante de composantes annuelles

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Conclusion
Conclusion

- Procedures are available from the within-bale variability study

- Procédures disponibles à partir de l'étude de variabilité intra-balle

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Conclusion
Conclusion

- Procedures are available from the within-bale variability study

- Adjustments may decrease cost of testing from observation of the between-bales variability study, along the season, on several seasons

- Procédures disponibles à partir de l'étude de variabilité intra-balle

- Des ajustements peuvent diminuer les coûts de tests à partir de l'observation de la variabilité inter-balles, au long de la saison, sur plusieurs saisons

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Conclusion
Conclusion

- Procedures are available from the within-bale variability study

- Adjustments may decrease cost of testing from observation of the between-bales variability study, along the season, on several seasons

- Instrumental classing is technically feasible in Africa; it only remains to make it économically possible on an every day basis

- Procédures disponibles à partir de l'étude de variabilité intra-balle

- Des ajustements peuvent diminuer les coûts de tests à partir de l'observation de la variabilité inter-balles, au long de la saison, sur plusieurs saisons

- Le classement instrumental est techniquement possible en Afrique ; il reste à le rendre économiquement opérationnel dans la vie de tous les jours

More details in:

Plus de détails dans :

ABOÉ M., GOURLOT J.-P., GOZÉ E., HUBLÉ P. and SINOIMERI A., 2011, New Findings on Within Bale Repeatability of Measurements obtained with Standardized Instruments for Testing Cotton (SITC) in Gossypium Hirsutum Fiber Produced in West and Central Africa, accepted in Textile Research Journal, sous presse.

Thanks for your attention